

Patent Abstracts of Japan

PUBLICATION NUMBER : 2002250052
PUBLICATION DATE : 06-09-02

APPLICATION DATE : 26-02-01
APPLICATION NUMBER : 2001050663

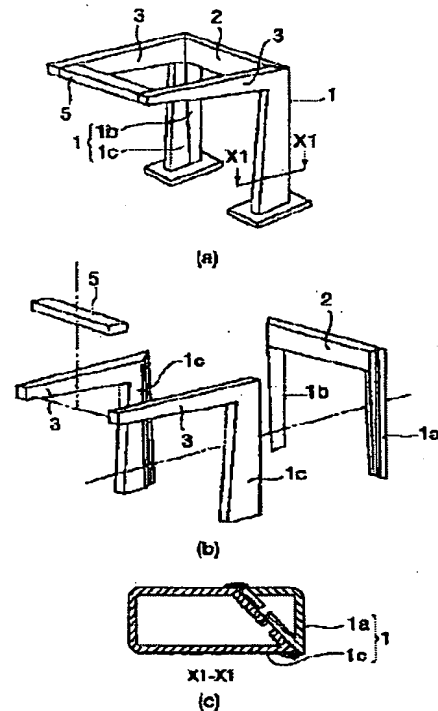
APPLICANT : KOMATSU LTD;

INVENTOR : URANAKA KYOJI;

INT.CL. : E02F 9/16

TITLE : DRIVER PROTECTING STRUCTURE
OF SELF-PROPELLED VEHICLE

第1実施例



1:主柱、1a:第1柱、1b:第2柱、1c:第3柱、2,3:梁、
5:第2の梁(補強メンバ)

ABSTRACT : PROBLEM TO BE SOLVED: To facilitate various aspects, namely manufacturing, stocking, transportation, and handling in a service field in a driver protecting structure of a self-propelled vehicle having a stereoscopic structure.

SOLUTION: This driver protecting structure of the self-propelled vehicle has main columns 1 stood right and left at the back of a driver's seat of the self-propelled vehicle; a beam 2 installed between the main columns 1, and cantilevers 3 overhung right and left in front of the driver's seat from respective tops of the main columns 1. A first column 1a is joined to one end of the beam 2, a second column 1b is joined to the other end, respective third columns 1c are joined to overhanging parts of right and left cantilevers 3, the first column 1a and one of the right and left third columns 1c are molded mutually joinably, and the second column 1b and the other of the right and left third columns 1c are molded mutually joinably. The first column 1a is joined to one of the right and left third columns 1c, they can be stood as one main column 1 on one side of the right and left sides at the back of the driver's seat, the second column 1b is joined to the other of the right and left third columns 1c, and they can be stood as one main column 1 on the other side of the right and left sides at the back of the driver's seat.

COPYRIGHT: (C)2002,JPO

(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号
特開2002-250052
(P2002-250052A)

(43) 公開日 平成14年9月6日(2002.9.6)

(51) Int.Cl.⁷

E 0 2 F 9/16

識別記号

F I

E 0 2 F 9/16

テーマコード(参考)

A 2 D 0 1 5

審査請求 未請求 請求項の数 5 O L (全 8 頁)

(21) 出願番号 特願2001-50663(P2001-50663)

(22) 出願日 平成13年2月26日(2001.2.26)

(71) 出願人 000001236

株式会社小松製作所

東京都港区赤坂二丁目3番6号

(72) 発明者 浦中 恭司

栃木県小山市横倉新田400 株式会社小松
製作所小山工場内

Fターム(参考) 2D015 EA05

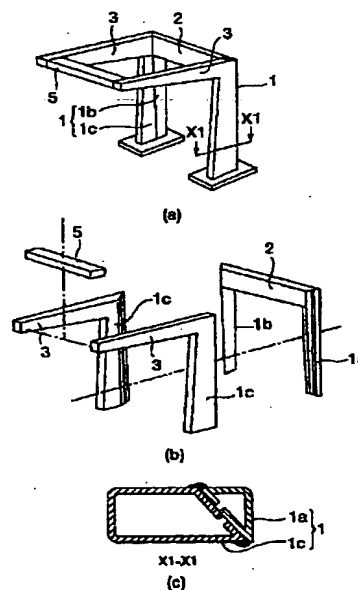
(54) 【発明の名称】 自走車両の運転者保護構造

(57) 【要約】

【課題】 立体構造なる自走車両の運転者保護構造を製造、在庫、輸送及び使用地での取り扱いの各面で容易化する。

【解決手段】 自走車両の運転席の後方左右に夫々立設した支柱(1)と、支柱(1)間に架設した梁(2)と、支柱(1)の各頂部から運転席の前方左右へ夫々張り出した片持ち梁(3)とを有する自走車両の運転者保護構造において、梁(2)の一端に第1柱(1a)を接合し、かつ他端に第2柱(1b)を接合し、左右の片持ち梁(3)の張り出し部に第3柱(1c)を夫々接合し、第1柱(1a)と左右の第3柱(1c)の一方とを互いに接合自在に成形し、かつ第2柱(1b)と左右の第3柱(1c)の他方とを互いに接合自在に成形すると共に、第1柱(1a)と左右の第3柱(1c)の一方とを接合して運転席の後方左右の一方に1本の支柱(1)として立設可能とし、かつ第2柱(1b)と左右の第3柱(1c)の他方とを接合して運転席の後方左右の他方に1本の支柱(1)として立設可能としてある。

第1実施例



1: 支柱、1a: 第1柱、1b: 第2柱、1c: 第3柱、2, 3: 梁、
5: 第2の梁 (補強メンバ)

【特許請求の範囲】

【請求項1】 自走車両の運転席の後方左右に夫々立設した主柱(1)と、主柱(1)間に架設した梁(2)と、主柱(1)の各頂部から運転席の前方左右へ夫々張り出した片持ち梁(3)とを有し、運転席への落下物及び／又は車両の転がりから運転席に着座した運転者を保護する自走車両の運転者保護構造において、梁(2)の一端に第1柱(1a)を接合し、かつ他端に第2柱(1b)を接合し、左右の片持ち梁(3)の張り出し部に第3柱(1c)を夫々接合し、第1柱(1a)と左右の第3柱(1c)の一方とを互いに接合自在に成形し、かつ第2柱(1b)と左右の第3柱(1c)の他方とを互いに接合自在に成形すると共に、第1柱(1a)と左右の第3柱(1c)の一方とを接合して運転席の後方左右の一方に1本の主柱(1)として立設可能とし、かつ第2柱(1b)と左右の第3柱(1c)の他方とを接合して運転席の後方左右の他方に1本の主柱(1)として立設可能としたことを特徴とする自走車両の運転者保護構造。

【請求項2】 前記「梁(2)の一端に第1柱(1a)を接合し、かつ他端に第2柱(1b)を接合し」てなる梁(2)及び第1、第2柱(1a, 1b)を含む平面は、その運転席側面及び反運転席側面のいずれか一方又は両方に壁用パネル(4)を有することを特徴とする請求項1記載の自走車両の運転者保護構造。

【請求項3】 自走車両の運転席回りに互いに離間して立設した少なくとも3本の主柱(1)と、運転席回りの回り方向での2本の柱(1)間に架設した梁(2)とを有し、運転席への落下物及び／又は車両の転がりから運転席に着座した運転者を保護する自走車両の運転者保護構造において、梁(2)の一端に第1柱(1a)を接合し、かつ他端に第2柱(1b)を接合し、この「梁(2)の一端に第1柱(1a)を接合し、かつ他端に第2柱(1b)を接合し」てなる梁(2)及び第1、第2柱(1a, 1b)を含む平面同士を、一方の平面の第1柱(1a)と、他方の平面の第2柱(1b)とが互いに接合自在となるように、第1、第2柱(1a, 1b)を成形すると共に、一方の平面の第1柱(1a)と、他方の平面の第2柱(1b)とを接合して運転席回りの所定の位置に1本の主柱(1)として立設可能とされていることを特徴とする自走車両の運転者保護構造。

【請求項4】 前記平面の少なくとも一つは、その運転席側面及び反運転席側面のいずれか一方又は両方に壁用パネル(4)を有することを特徴とする請求項3記載の自走車両の運転者保護構造。

【請求項5】 前記平面は、壁用パネル(4)を着脱自在に有することを特徴とする請求項2又は4記載の自走車両の運転者保護構造。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、自走車両の運転者保護構造に関する。

【0002】

【従来の技術】自走車両の運転者保護構造は、自走式の例えば中大形建設機械の運転席回りに立設されて運転席への落下物及び／又は車両の転がりから運転席に着座した運転者を保護する構造である。

【0003】運転席への落下物から運転席に着座した運転者を保護する構造とは、いわゆるFOPS(Falling-object protective structures)を指す。一方、車両の転がりから運転席に着座した運転者を保護する構造とは、いわゆるROPS(Roll-overprotective structures)を指す。これらは、例えばISO 3164-1976(E)、3449-1975、3471-1975及びSAE J1040-1994等によって所定強度を要求される。これらは単独構成か又は合体構成である。以下、FOPS及び／又はROPSを単に「保護構造(自走車両の運転者保護構造)」とする。

【0004】保護構造は主柱を複数有し、主柱の数によって二柱式と、三柱以上式とに大別できる。二柱式は、図7(a)に示す通り、自走車両(不図示)の運転席(不図示)の後方左右に夫々立設した主柱1と、主柱1間に架設した梁2と、主柱1の各頂部から運転席の前方左右へ夫々張り出した片持ち梁3とを有する。即ち、二柱式は片持ち梁式保護構造である。三柱以上式は、図8(a)及び図9(a)に示す通り、自走車両(不図示)の運転席(不図示)回りに互いに離間して立設した少なくとも3本の主柱1と、運転席回りの回り方向での2本の主柱1間に架設した梁2とを有する。主柱1は形鋼から1本ずつ得てもよいが、形鋼では外観上の問題から、例えば断面形状が長方形(図7(b))、円形(図8(b))及び正方形(図9(b))等、平鋼を曲げて曲げ両端を溶接した1本ずつの筒体である。この筒体1によって保護構造の軽量化、高強度化及び外観美化等を図る。

【0005】保護構造にはキャビンを取り付けることが多く、キャビン内装形とキャビン外装形とがある。例えば図9(a)は、保護構造の前後左右の各外面に壁用パネル4F、4B、4L、4Rを取り付け、上面に屋根4Uを取り付けたキャビン外装形である。尚、4Fは前面パネル、4Bは後面パネル、4Lは左側面パネル、4Rは右側面パネルである。

【0006】

【発明が解決しようとする課題】ところで、上記従来の保護構造は規格を満足すべく製造するが、規格を遵守するあまり、規格書に記載の立体構造のままに製造し、完成品として単品出荷されるか又は保護構造付き車両として車両と共に出荷される(例えば特開平6-240707号参照)。従って次の不都合が生じている。

【0007】(1)保護構造が立体構造であり、また溶接構造が主体となるため、製造時に上向き溶接が生じて溶接欠陥を生じ易い。そこで、上向き溶接に基づく溶接欠陥の発生を防止するために溶接熟練者及び保護構造反転治具等を揃える必要があり不経済である。

【0008】(2) 保護構造が立体構造であるため、製造工場での半完成品及び完成品の仮置地が広くなり不経済である。従って、在庫数が制限され、緊急出荷への即応性が劣る。

【0009】本発明、上記従来技術の不都合のうちの少なくとも一つを解消できる自走車両の運転者保護構造を提供することを目的とする。

【0010】

【課題を解決するための手段及び作用効果】上記目的を達成するために、本願発明者は、保護構造が有する複数の主柱と梁との接合関係に着目した。

【0011】第1の着目点は次の通り。保護構造であるからには、主柱及び梁の強度が従来のものよりも低下してはならない。そこで、各主柱を1本ごとに2本化し(第1柱と第2柱、第1柱と第3柱、又は、第2柱と第3柱)、これらを必要時に接合して1本に戻すようにすれば、従来技術なる1本の主柱よりもさらに高強度化することに着目した。これは設計の自由度を増大させ、主柱の小径化に寄与する。また、主柱の小径化は保護構造の運転席側容積を拡大させ、かつ美観を向上させる。

【0012】第2の着目点は次の通り。梁の両端又は一端に2本化した柱の一方を接合すれば、梁と柱とを縁としたほぼ平らな平面が生じ、そしてこの平面を半完成品と見做せることに着目した。尚、「ほぼ平らな平面」の「ほぼ」とは、例えば梁が少し湾曲している場合を指す。また、この平面は梁及び柱で構成されるから仮想平面である。また、この平面内には他の主柱が存在してもよく、そしてこの「他の主柱」は2本化させる必要はない。そして平面であるから、次の作用効果が生ずる。

【0013】平面であり、また小形化し、軽量化するから、上向き溶接を無くせる。つまり、反転治具がなくとも下向き溶接できる。この結果、上向き溶接に基く溶接欠陥の発生を防止でき、また溶接熟練者及び保護構造反転治具も不要となる。平面であるから平積みでき、この結果、狭い場所でも多量に平積み在庫でき、緊急出荷に即応して早急に立体化できる。尚、保護構造は二柱式と三柱以上式とでは、平面の数等が自ずと相違し、そこでこの相違に配慮したものが第1、第3発明である(第1発明は二柱式、第3発明は三柱以上式である)。

【0014】第3の着目点は次の通り。上記第1、第3発明ではその各平面に対し壁用パネル及び屋根を取り付けてもよく、そして壁用パネル及び屋根もまた平面構造である。従って、上記第1、第2の着目点による作用効果を損ねない。そして、二柱式と三柱以上式との相違に配慮したのが、第2、第4、第5発明である(第2発明は二柱式、第4発明は三柱以上式、第5発明は両式共用である)。

【0015】

【発明の実施の形態及び実施例】実施例を図1～図6を参照し説明する。尚、前記従来図7～図9と同一要素

には同一符号を付して重複説明をできるだけ省略する。また、図1～図6において(既説の図7～図9も同じ)、図示左側は自走車両(不図示)の前側、図示右側は後側である。従って例えば図示左主柱は運転席(不図示)上の運転者から見て右主柱、図示右主柱は左主柱である。以下に記載の「前、後、左、右」の夫々は、このように運転者から見てのものである。

【0016】第1実施例は、図1に示す通り、二柱式である。そして図1(a)は図7(a)に外観上ほぼ対応する。従って第1実施例もまた、図7(a)と同じく、自走車両の運転席の後方左右に夫々立設した主柱1と、主柱1間に架設した梁2と、主柱1の各頂部から運転席の前方左右へ夫々張り出した片持ち梁3とを有する。ところが第1実施例は、図1(b)に示す通り、4分割構造であり、各分割体は半完成品とされ、従って図7(a)の構造とは異なる構造となっている。詳しくは次の通り。

【0017】図1(b)に示す通り、梁2は左端に下方に向けて第1柱1aの頂部を接合し、右端にも下方に向けて第2柱1bの頂部を接合して平面状の第1分割体としている。左右の片持ち梁3の張り出し部もまた夫々に下方に向けて第3柱1cの頂部を接合して平面状の第2、第3分割体としている。尚、図1(c)に示す通り、第1、第2柱1a、1bの断面形状は三角形の筒であり、第3柱1cの断面形状は台形の筒である。そして、第1柱1aと左側の第3柱1cとは、互いに溶接自在に成形してあり、同じく第2柱1bと右側の第3柱1cとも互いに溶接自在に成形してある。

【0018】従って、第1実施例なる保護構造を立体化する際は、例えば運転席回りに立設する際は、第1、第3柱1a、1cのいずれか一方又は両方の下端部を運転席の後部左側の所定位置にボルト締め等(不図示)によって立設すると共に、両接合端面を溶接して(望ましくは全周溶接して)1本の主柱1とする(第1、第2分割体間の溶接である)。さらに、第2、第3柱1b、1cのいずれか一方又は両方の下端部も運転席の後部右側の所定位置にボルト締め等(不図示)によって立設すると共に、両接合端面を溶接して(望ましくは全周溶接して)1本の主柱1とする(第1、第3分割体間の溶接である)。

【0019】尚、第1～第3分割体間の溶接を、詳細を後述する図5及び図6に例示するように、ボルト締めとしてもよく、また溶接とボルト締めとを組み合わせ接合としてもよい。

【0020】第1～第3分割体間の接合に前後して第2の梁5(「第4分割体」である)の左右端を左右の片持ち梁3の先端にボルト(不図示)で夫々固定する。尚、第2の梁5の片持ち梁3への固定は、例えば第2の梁5の端部の上面開先を大きくしてこの開先に対する下向き溶接だけとしたり、又は、第2の梁5と片持ち梁3との

固定部の形状を下向き溶接専用の形状としてもよい。

【0021】尚、上記運転席回りへの保護構造の立設工程には、詳記しなかったが、分割体同士の仮の位置決め作業及びアラインメント調整作業が適宜含まれる。

【0022】ところで、第1実施例は基本的にはROPSである。ところがこのROPSに、例えばFOPSの強度規格を満足する厚鋼板の屋根4U（図3（b）又は図9（a）参照）又は補強メンバ6（図3（a）参照）入り鋼板でなる屋根4Uを加設すれば、ROPS兼FOPSとなる。上記第2の梁5はFOPS用の補強メンバを兼ねている。また、支柱1がROPSの強度規格を満足していなくても、FOPSの強度規格を満足させれば、FOPSのみとなる（転倒の機会がなく、かつ落下物を受ける懸念のある稼動地で稼動する小形車両に対して好適である）。

【0023】第1実施例の作用効果を述べる。

【0024】（1）支柱1が第1、第3柱1a、1cの二重構造となり、かつ第2、第3柱1b、1cの二重構造となる。仮に鋼板の材質、厚さ及び断面形状が同じであれば、二重構造は一重構造に比較して曲げ剛性及び捩じれ剛性が向上する。従って、第1実施例の保護構造は剛性が基本的には向上する。換言すれば、同強度であれば、支柱1を小径化でき、保護構造の内部空間を拡大でき、かつ外観美観が向上する。

【0025】（2）第1～第3柱1a～1cは、図1（c）に示す通り、各接合側の面で縦方向に若干開口し（より正しくは「閉じるための溶接を行っていない」ということである）、かつ接合状態で両開口が互いに一致しない位置に成形してある。即ち開口が一致しないため、各第1～第3柱1a～1cごとの単体強度が接合後に補完し合って接合後の支柱1の強度低下を防止する。また、各第1～第3柱1a～1cの開口を閉じる溶接作業を省けて生産性がよい。尚、各第1～第3柱1a～1cの開口を夫々溶接して完全な筒体としてもよい。この場合、開口を閉じるための溶接作業が増加するが、接合後の支柱1の強度は上記開口式の2本の柱の接合後のものよりも高い。また、第1実施例での接合後の支柱1が筒体となるため、美観を損ねない。さらに、各第1～第3柱1a～1cの断面形状を各種準備できるため、設計自由度が広がり、各分割体は元よりのこと、保護構造自体についても、さらなる高剛性化、軽量化、容易製造化上及び美観向上を図れる。

【0026】（3）第1～第4分割体は半完成品であるが、夫々はほぼ平面内に収まる（以下「平面構造」とする）。従って次の作用効果を奏する。

【0027】（1）各分割体が平面構造であり、しかも保護構造から見れば小物である。従って、反転治具がなくとも上向き溶接を無くすことができる。この結果、溶接欠陥が生じにくい。つまり、溶接熟練者や保護構造反転治具を揃える必要もなく、製造効率が向上し、経済的

である。

（2）各分割体は半完成品として在庫できるが、これらは総べて平面構造であるから、積み重ねて在庫できる。従って狭い場所で多くの在庫を確保できる。このため、緊急出荷時に際して早急に立体化させて保護構造にできる。このときも、第1実施例ではその保護構造自体にも上向き溶接がないため、品質確保が容易な保護構造を素早く製造し、出荷できる。

（3）車格が大きく異なっても保護構造までもが車格に比例して大きくなることはない。従って、各分割体を少種類だけ在庫し、これらの組合せによって車格ごとに異なる大きさ及び形式の保護構造に組み立てる自由度が生ずる。勿論、在庫の種類も抑えることができ、かつ在庫場所を小さくできる。

（4）各分割体間の接合構造を、詳細を後述する図5及び図6に例示するボルト締めとすれば、その立体化をさらに手早く、かつ容易に行える。

（5）図示しないが、各分割体を運転席側面（内面）又は反運転席側面（外面）から覆う壁用パネルを、さらには保護構成の前面を覆う壁用パネルを、各分割体のうちの少なくとも一つに対し着脱自在となるように、各分割体を予め構成しておくのが好ましい。このようにすると、キャビン付きの保護構造を即席に立体化できる。尚、上記「各分割体のうちの少なくとも一つ」とは、壁用パネルの数によって、全密閉形キャビン又は半密閉形キャビンとすることができるからである。尚、全密閉形キャビンの場合は、屋根4Uを取り付けることは当然である。

【0028】第2実施例なる図2は三柱式であり、第3実施例なる図3及び図4は4支柱式である（つまり、第2、第3実施例は三柱以上式である）。第2、第3実施例の斜視図なる図2（a）及び図3（a）は、図8

（a）及び図9（a）に外観上ほぼ対応する。従って第2、第3実施例もまた、図8（a）及び図9（a）と同じく、自走車両（不図示）の運転席（不図示）回りに互いに離間して立設した少なくとも3本の支柱1と、運転席回りの回り方向での2本の支柱1間に架設した梁2とを有して構成される。以下、第2、第3実施例について、第1実施例と相違する点のみ説明する。

【0029】第2実施例もまた、図2（b）に示す通り、分割構造である。但し、第2実施例は、第1実施例のような片持ち梁式保護構造ではなく、3点支持式保護構造である。従って、第2実施例は、図2（a）に示す通り、第1実施例のような左右の片持ち梁3及び第2の梁5を有さない。即ち、ほぼ平らな後面、右面及び前左面の3分割構造である。各分割体は夫々、梁2の左端に下方に向けて第1柱1aの頂部を接合し、右端にも下方に向けて第2柱1bの頂部を接合した半完成品となる。尚、各分割体の第1柱1aと第2柱1bとは、図2

（c）に示す通り、断面形状が半円の筒体であり、いず

れも接合側面で若干開口し、かつ開口が重複しないようにし、互いに溶接接合自在に成形してある。尚、各開口を溶接した完全な筒体としてもよい。

【0030】従って、第2実施例を運転席回りに立設するとき、各分割体間の第1、第2柱1a、1bのいずれか一方又は両方の下端部を運転席の所定位置にボルト締め（不図示）等により立設した後、これらの接合端面を溶接して（望ましくは全周溶接して）各1本ずつの主柱1とすることとなる。

【0031】上記第2実施例の作用効果は、基本的には第1実施例の既説の作用効果と同じである。従って、重複説明は省略する。

【0032】第3実施例もまた、図3（b）に示す通り、分割構造である。但し、第3実施例は4点支持式保護構造である。従って、第3実施例は、第2実施例と同じく、図3（a）に示す通り、第1実施例のような左右の片持ち梁3及び第2の梁5を有さない。即ち、ほぼ平らな前後面及び左右面の4分割構造である。各分割体は夫々、梁2の左端に下方に向けて第1柱1aの頂部を接合し、右端にも下方に向けて第2柱1bの頂部を接合して構成され、半完成品とされる。尚、各分割体の第1柱1aと第2柱1bとは、図3（c）に示す通り、断面形状が正三角形の筒体とし、いずれも接合側面で若干開口し、かつ開口が一致しないようにし、互いに溶接接合自在に成形してある。

【0033】従って、第3実施例を運転席回りに立設するとき、各分割体間の第1、第2柱1a、1bのいずれか一方又は両方の下端部を運転席の所定位置にボルト締め（不図示）等により立設した後、これらの接合面を溶接して（望ましくは全周溶接して）各1本ずつの主柱1とすることとなる。

【0034】尚、図3（b）には、各4面の分割体の外面から覆う壁用パネル4（4F、4B、4L、4R）を、さらには屋根4Uを、各分割体及び上部に着脱自在としたことを示す。この場合も、全密閉形キャビン又は半密閉形キャビンとすることができることは説明するまでもない。

【0035】上記第3実施例の作用効果もまた、第1実施例の既説の作用効果と同じである。従って、重複説明は省略する。

【0036】尚、第3実施例での第1、第2柱1a、1bの断面形状もまた適宜選択してよいが、その実例を、図4の断面形状が長方形の接合面溶接式で示す。この例の場合の接合完了状態の保護構造（部分図）を図4

（a）に、分割状態を図4（b）に、全周溶接例の部分図を図4（c）に示す。このように、第1、第2柱1a、1bの断面形状は適宜選択できる。また、各分割体の溶接は横向きとなるが、上向きと比較すれば、容易であり、従って溶接欠陥は生じにくい。

【0037】尚、既出の図5及び図6なるボルト締め

による分割体間の接合例を補足説明する。筒体に孔を設けたり、また極度な凹凸があると、周知の通り、その曲げ剛性及び／又はねじり剛性が低下する。そこで、断面形状が正三角形の筒体同士をボルト締めした図5と、断面形状が長方形の筒体同士をボルト締めした図6とから構成を部分抽出しながら種々態様例を説明する。

【0038】図5及び図6に示す通り、第1、第2柱1a、1b間の接合側面には、ボルト71の貫通孔72を夫々設けてある。また、第1柱1aの反接合側の面にナット73付きのカラー74aの貫通孔75aを設け、ナット73の頭部が第1柱1aの外面から外部へ大きく突出しないように、カラー74aを貫通孔75aに挿入し、ナット73を貫通孔75aの内周に外周溶接してある。一方、第2柱1bの反接合側の面に凹み76を設け、凹み76の底部にカラー74bの貫通孔75bを設け、カラー74bを貫通孔75bに挿入し、貫通孔75bの内周に外周溶接してある。

【0039】従って、第1、第2柱1a、1b間の接合では、ボルト71をカラー74b、貫通孔72及びカラー74aを経て挿入し、ナット73に締め付ける。このような構成を第1、第2柱1a、1b間に複数個所設けることとなる。このようなボルト締め例によれば、両カラー74a、74bがボルト71の軸力を受け、そして両カラー74a、74bに第1、第2柱1a、1bが固設されることになるから、第1、第2柱1a、1bに孔（貫通孔72、75a、75b）を設けたり、かつ凹み76を設けたからといって、第1、第2柱1a、1bの曲げ剛性及びねじり剛性が低下することも殆どない。

【0040】また、両カラー74a、74bは第1、第2柱1a、1b間の接合側の面に微小隙間 δ を有してもよく、当接させてもよく（ $\delta=0$ ）、また貫通孔72内まで挿入させて外周溶接しても構わない。

【図面の簡単な説明】

【図1】第1実施例を示す図であり、（a）は斜視図、（b）は組立図、（c）は（a）のX1-X1断面図である。

【図2】第2実施例を示す図であり、（a）は斜視図、（b）は組立図、（c）は（a）のX2-X2断面図である。

【図3】第3実施例を示す図であり、（a）は斜視図、（b）は組立図、（c）は（a）のX3-X3断面図である。

【図4】第3実施例での変更例を示す図であり、（a）は斜視図、（b）は組立図、（c）は（a）のP部拡大図である。

【図5】ボルト締めの第1例を示す図である。

【図6】ボルト締めの第2例を示す図である。

【図7】従来の第1例を示す図であり、（a）は斜視図、（b）は（a）のX4-X4断面図である。

【図8】従来の第2例を示す図であり、（a）は斜視

図、(b)は(a)のX5-X5断面図である。

【図9】従来の第3例を示す図であり、(a)は組立図、(b)は(a)のX6-X6断面図である。

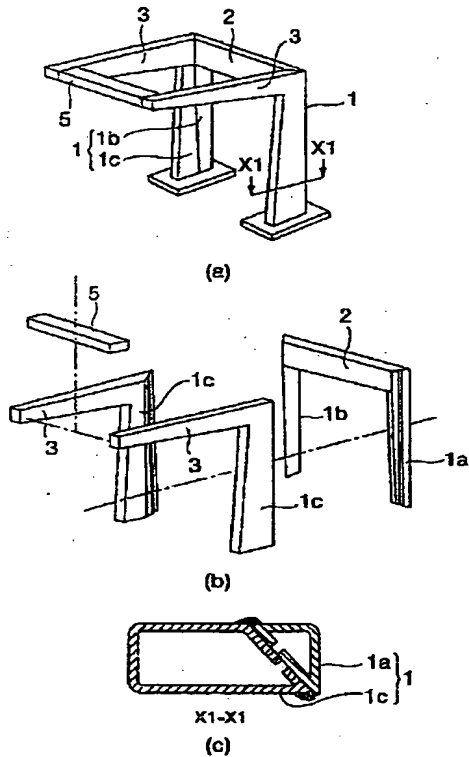
【符号の説明】

1:主柱、1a:第1柱、1b:第2柱、1c:第3

柱、2、3:梁、4:壁用パネル、4F:前面パネル、4B:後面パネル、4L:左側面パネル、4R:右側面パネル、4U:屋根、5:第2の梁(補強メンバ)、6:補強メンバ。

【図1】

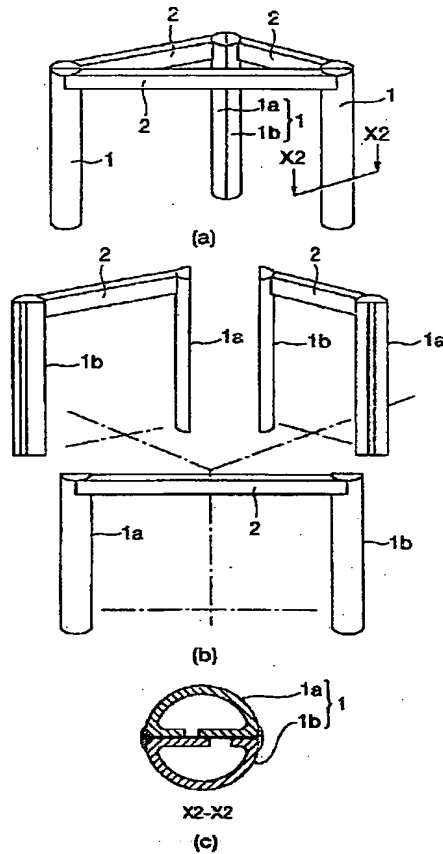
第1実施例



1:主柱、1a:第1柱、1b:第2柱、1c:第3柱、2,3:梁、5:第2の梁(補強メンバ)

【図2】

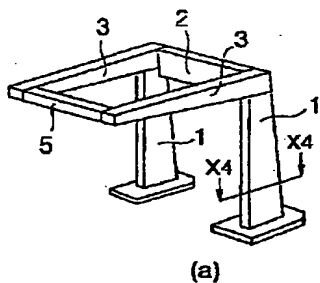
第2実施例



1:主柱、1a:第1柱、1b:第2柱、2:梁

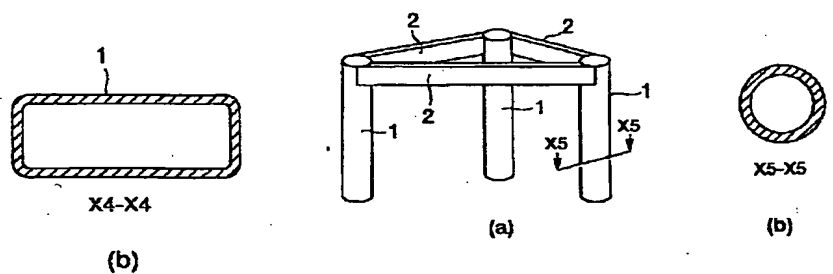
【図7】

従来の第1例

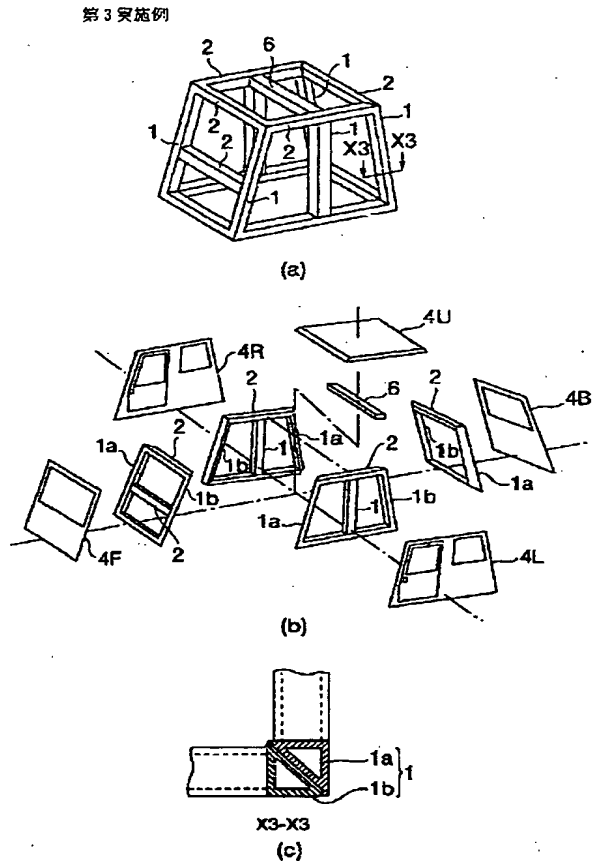


【図8】

従来の第2例

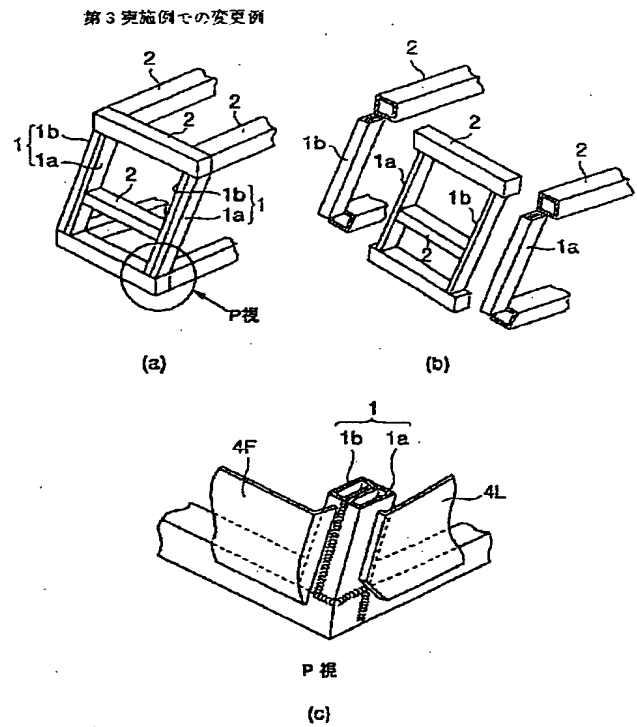


【図3】



1: 主柱、1a: 第1柱、1b: 第2柱、2: 梁、
4F: 前面パネル、4B: 後面パネル、4L: 左側面パネル、
4R: 右側面パネル、4U: 屋根、6: 補強メンバ

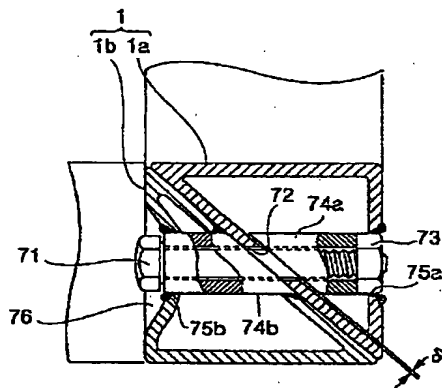
【図4】



1: 主柱、1a: 第1柱、1b: 第2柱、2: 梁、
4F: 前面パネル、4L: 左側面パネル

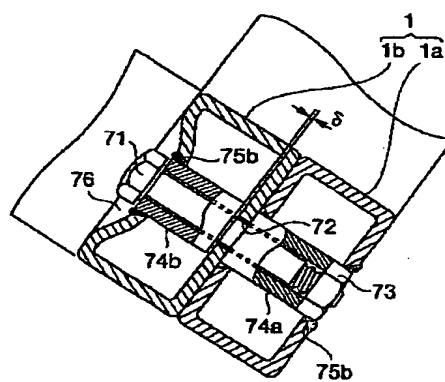
【図5】

ボルト締め第1例

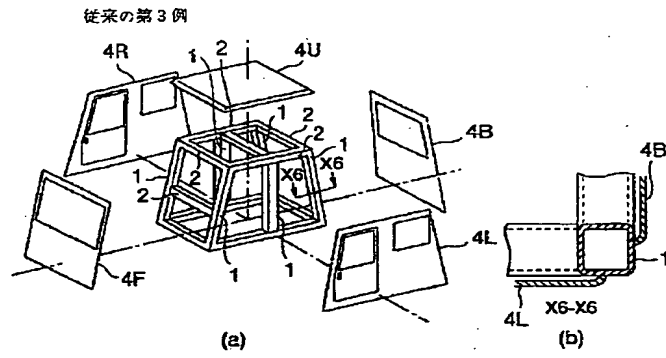


【図6】

ボルト締め第2例



【図9】



* NOTICES *

JPO and NCIP are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] The main pillar (1) set up to back right and left of the driver's seat of an automotive vehicle, respectively, and the beam constructed between main pillars (1) (2), In the operator protective construction of the automotive vehicle which takes care of the operator who sat down to the driver's seat since it has the cantilever (3) jutted out of each crowning of a main pillar (1) to front right and left of a driver's seat, respectively and the falling object to a driver's seat and/or the car rolled Join the 1st column (1a) to the end of a beam (2), and the 2nd column (1b) is joined to the other end. The 3rd column (1c) is joined to the overhang section of a cantilever (3) on either side, respectively. While fabricating mutually one side of the 1st column (1a) and the 3rd column (1c) on either side free [junction] and fabricating mutually another side of the 2nd column (1b) and the 3rd column (1c) on either side free [junction] Join one side of the 1st column (1a) and the 3rd column (1c) on either side, and a set-up is made possible as one main pillar (1) at one side of back right and left of a driver's seat. And the operator protective construction of the automotive vehicle characterized by having joined another side of the 2nd column (1b) and the 3rd column (1c) on either side, and making a set-up possible as one main pillar (1) on another side of back right and left of a driver's seat.

[Claim 2] the above -- " -- the end of a beam (2) -- the 1st column (1a) -- joining -- and the other end -- the 2nd column (1b) -- joining -- " -- ** -- the operator protective construction of the automotive vehicle according to claim 1 characterized by the flat surface containing a beam (2) and the 1st and 2nd column (1a, 1b) having a panel for walls (4) in both the drivers side side, and anti-drivers side both [either or].

[Claim 3] At least three main pillars which estranged each other and were set up to the circumference of the driver's seat of an automotive vehicle (1), In the operator protective construction of the automotive vehicle which takes care of the operator who sat down to the driver's seat since it has the beam (2) constructed between two columns (1) in the direction of the surroundings of the circumference of a driver's seat and the falling object to a driver's seat and/or the car rolled Join the 1st column (1a) to the end of a beam (2), and the 2nd column (1b) is joined to the other end. this -- " -- the end of a beam (2) -- the 1st column (1a) -- joining -- and the other end -- the 2nd column (1b) -- joining -- " -- ** -- the flat surfaces containing a beam (2) and the 1st and 2nd column (1a, 1b) with the 1st column (1a) of one flat surface While fabricating the 1st and 2nd column (1a, 1b) so that junction of the 2nd column (1b) of the flat surface of another side may be attained mutually The operator protective construction of the automotive vehicle characterized by joining the 1st column (1a) of one flat surface, and the 2nd column (1b) of the flat surface of another side, and making the set-up possible as one main pillar (1) at the position of the circumference of a driver's seat.

[Claim 4] At least one of said the flat surfaces is the operator protective construction of the automotive vehicle according to claim 3 characterized by having a panel for walls (4) in both the drivers side side, and anti-drivers side both [either or].

[Claim 5] Said flat surface is the operator protective construction of the automotive vehicle according to claim 2 or 4 characterized by having a panel for walls (4), enabling free attachment and detachment.

[Translation done.]

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the operator protective construction of an automotive vehicle.

[0002]

[Description of the Prior Art] the operator protective construction of an automotive vehicle -- a self-propelled mode, for example, Chuo University, -- since it is set up at the circumference of the driver's seat of a form construction equipment and the falling object to a driver's seat and/or a car roll, it is the structure of taking care of the operator who sat down to the driver's seat.

[0003] The structure of protecting the operator who sat down to the driver's seat from the falling object to a driver's seat points out the so-called FOPS (Falling-object protective structures). the structure of on the other hand taking care of the operator who sat down to the driver's seat since a car rolls points out the so-called ROPS (Roll-overprotective structures). Predetermined reinforcement is required of these by ISO 3164-1976(E), 3449-1975, 3471-1975, and SAE J1040-1994 grade. these -- an independent configuration -- or it is a coalesce configuration. Hereafter, only let FOPS and/or ROPS be "protective constructions (operator protective construction of an automotive vehicle)."

[0004] A protective construction has two or more main pillars, and can divide them roughly into a 2 column type and a three or more columns type with the number of main pillars. A 2 column type has the main pillar 1 set up, respectively to back right and left of the driver's seat (un-illustrating) of an automotive vehicle (un-illustrating), the beam 2 constructed between main pillars 1, and the cantilever 3 jutted out of each crowning of a main pillar 1 to front right and left of a driver's seat, respectively as it is shown in drawing 7 (a). That is, a 2 column type is a cantilever type protective construction. A three or more columns type has the beam 2 constructed between at least three main pillars 1 which estranged each other and were set up to the circumference of the driver's seat (un-illustrating) of an automotive vehicle (un-illustrating), and two main pillars 1 in the direction of the surroundings of the circumference of a driver's seat as it is shown in drawing 8 (a) and drawing 9 (a). Although you may obtain one main pillar 1 at a time from shape steel, in shape steel, cross-section frame configurations are a rectangle (drawing 7 (b)) and barrels per which bent flat steel and welded bending both ends, such as circular (drawing 8 (b)) and a square (drawing 9 (b)), from an exterior problem, for example. Lightweight-izing of a protective construction, high-intensity-izing, appearance beautification, etc. are attained by this barrel 1.

[0005] CABIN is attached in a protective construction in many cases, and there are a CABIN interior form and a CABIN sheathing form. For example, drawing 9 (a) is the CABIN sheathing form where attached the panels 4F, 4B, 4L, and 4R for walls in each external surface of front and rear, right and left of a protective construction, and roof 4U was attached in the top face. In addition, for 4F, a front panel and 4B are [a left lateral panel and 4R of the rear panel and 4L] right lateral panels.

[0006]

[Problem(s) to be Solved by the Invention] By the way, although the above-mentioned

conventional protective construction is manufactured that specification should be satisfied, it manufactures with a spacial configuration given in a specification document, and item shipment is carried out as a finished product, or it is shipped with a car as a car with a protective construction just because it **** specification (for example, refer to JP,6-240707,A). Therefore, un-arranging [of a degree] has arisen.

[0007] (1) A protective construction is a spacial configuration, and since a welded construction serves as a subject, at the time of manufacture, an overhead welding arises and it is easy to produce a weld flaw. Then, in order to prevent generating of a weld flaw based on an overhead welding, it is necessary to arrange a welding expert, a protective-construction reversal fixture, etc., and uneconomical.

[0008] (2) Since a protective construction is a spacial configuration, the temporary placing ground of the semifinished product in a plant and a finished product becomes large and is uneconomical. Therefore, the number of inventories is restricted and the readiness to urgent shipment is inferior.

[0009] It aims at offering the operator protective construction of the automotive vehicle which can cancel at least one of this invention and the above-mentioned conventional technique being inconvenient.

[0010]

[Means for Solving the Problem and its Function and Effect] In order to attain the above-mentioned purpose, the invention-in-this-application person paid his attention to the junction relation of the two or more main pillars and the beam which a protective construction has.

[0011] The 1st point paying its attention is as follows. Since it is a protective construction, the reinforcement of a main pillar and a beam must not fall rather than the conventional thing. then -- if (the 1st column, the 2nd column and the 1st column, the 3rd column, or the 2nd column and the 3rd column), these are joined at the time of the need and it is made to return to one -- the former -- a technique -- it noted high-intensity-izing further rather than one main pillar. [for / every] [each main pillar] [2] This increases the degree of freedom of a design and contributes to minor diameter-ization of a main pillar. Moreover, minor-diameter-izing of a main pillar makes the drivers side volume of a protective construction expand, and raises a fine sight.

[0012] The 2nd point paying its attention is as follows. When joining one side of the column [- izing / the column / 2] to the both ends or end of a beam, the almost even flat surface which used the beam and the column as the edge was generated, and it noted being able to consider that this flat surface is a semifinished product. in addition, "an almost even flat surface" -- "almost --" -- for example, the case where the beam is curving for a while is pointed out. Moreover, since this flat surface consists of a beam and a column, it is a virtual flat surface. moreover, the main pillar of the others in this flat surface -- you may exist -- and -- this -- "others -- it is not necessary to make main pillar" 2-izing And since it is a flat surface, the following operation effectiveness arises.

[0013] It is a flat surface and miniaturizes, and since it lightweight-izes, an overhead welding can be lost. That is, a flat welding can be carried out even if there is no reversal fixture.

Consequently, generating of a weld flaw based on an overhead welding can be prevented, and a welding expert and a protective-construction reversal fixture also become unnecessary. Since it is a flat surface, it can *****, consequently a ***** inventory can be carried out so much also in a narrow location, and it conforms to urgent shipment, and can solidify immediately. In addition, that from which the protective construction was different naturally and the number of plane etc. considered it by the 2 column type and the three or more columns formula there at this difference is the 1st and 3rd invention (the 1st invention is a 2 column type and the 3rd invention is a three or more columns type).

[0014] The 3rd point paying its attention is as follows. In the 1st and 3rd invention of the above, the panel for walls and a roof may be attached to each of that flat surface, and the panel for walls and a roof are also the planar structures. Therefore, the operation effectiveness with the above 1st and the 2nd point paying its attention is not spoiled. And the 2nd, 4th, and 5th invention considered the difference with a 2 column type and a three or more columns type (the 2nd invention is [a three or more columns type and the 5th invention of a 2 column type and the

4th invention] both formula common use).

[0015]

[The gestalt and example] of implementation of invention An example is explained with reference to drawing 1 - drawing 6 . In addition, the same sign is given to the same element as said conventional drawing 7 - drawing 9 , and duplication explanation is omitted as much as possible. Moreover, in drawing 1 - drawing 6 (the same is said of drawing 7 of an existing theory - drawing 9), illustration left-hand side is a before [an automotive vehicle (un-illustrating)] side, and illustration right-hand side is the backside. It follows, for example, an illustration left main pillar is seen from the operator on a driver's seat (un-illustrating), and a right main pillar and an illustration right main pillar are left main pillars. Each of the "before, after, the left, and the right" given in the following is seen from an operator in this way.

[0016] The 1st example is a 2 column type as it is shown in drawing 1 . And drawing 1 (a) corresponds to drawing 7 (a) mostly on an appearance. Therefore, the 1st example as well as drawing 7 (a) has the main pillar 1 set up to back right and left of the driver's seat of an automotive vehicle, respectively, the beam 2 constructed between main pillars 1, and the cantilever 3 jutted out of each crowning of a main pillar 1 to front right and left of a driver's seat, respectively. However, it is quadrisection structure and each division object has structure which is made into a semifinished product, therefore is different from the structure of drawing 7 (a) as the 1st example is shown in drawing 1 (b). It is as follows in detail.

[0017] A beam 2 joins the crowning of 1st column 1a caudad towards a left end, joins the crowning of 2nd column 1b also caudad towards a right end, and makes it the plane 1st minute segmenter as shown in drawing 1 (b). The overhang section of the cantilever 3 on either side is also boiled, respectively, is turned caudad, joins the crowning of 3rd column 1c, and makes it the plane 2nd and the 3rd minute segmenter. In addition, the cross-section configuration of the 1st and 2nd column 1a and 1b is a triangular cylinder, and the cross-section configuration of 3rd column 1c is a trapezoid cylinder as shown in drawing 1 (c). And 1st column 1a and left-hand side 3rd column 1c are fabricated free [welding] mutually, and, similarly 2nd column 1b and right-hand side 3rd column 1c are fabricated free [welding] mutually.

[0018] therefore, the 1st -- an example, in case a protective construction is solidified For example, in case it sets up to the circumference of a driver's seat, while setting up the lower limit section of either of the 1st and 3rd column 1a and 1c, or both by bolting etc. in the predetermined location on the left-hand side of [posterior part] a driver's seat (un-illustrating) Both the junction end face is welded and it considers as one (carrying out full circled welding desirably) main pillar 1 (it is welding between the 1st and the 2nd minute segmenter). Furthermore, while also setting up the lower limit section of either of the 2nd and 3rd column 1b and 1c, or both by bolting etc. in the predetermined location on the right-hand side of [posterior part] a driver's seat (un-illustrating), both the junction end face is welded and it considers as one (carrying out full circled welding desirably) main pillar 1 (it is welding between the 1st and the 3rd minute segmenter).

[0019] In addition, it is good also as bolting, and welding and bolting are combined and it is good also as junction so that welding between the 1st - the 3rd minute segmenter may be illustrated to drawing 5 and drawing 6 which mention a detail later.

[0020] Just before or after junction between the 1st - the 3rd minute segmenter, it fixes at the tip of the cantilever 3 of right and left of the right-and-left edge of the 2nd beam 5 (it is the "4th minute segmenter") with a bolt (un-illustrating), respectively. In addition, immobilization in the cantilever 3 of the 2nd beam 5 is good also as a configuration only for [the configuration of the fixed part of the 2nd beam 5 and a cantilever 3] flat weldings in enlarging the top-face groove of the edge of the 2nd beam 5, and considering only as the flat welding to this groove
****.

[0021] In addition, although a full account was not given, temporary positioning and alignment tuning of division objects are suitably included in the set-up process of the protective construction to the circumference of the above-mentioned driver's seat.

[0022] By the way, the 1st example is ROPS fundamentally. However, it will be set to ROPS-cum-FOPS if roof 4U set to this ROPS with roof 4U (refer to drawing 3 (b) or drawing 9 (a)) of a

steel plate or the steel plate containing reinforcing member 6 (refer to drawing 3 (a)) with which are satisfied of the specification of FOPS on the strength is ****(ed). The 2nd beam 5 of the above serves as the reinforcing member for FOPS. Moreover, if the main pillar 1 satisfies the specification of FOPS on the strength even if it has not satisfied the specification of ROPS on the strength, it will serve as only FOPS (it is suitable to the small car which works with an operation background with the concern which there is no opportunity of a fall and receives a falling object).

[0023] The operation effectiveness of the 1st example is described.

[0024] (1) A main pillar 1 serves as dual structure of the 1st and 3rd column 1a and 1c, and it becomes the dual structure of the 2nd and 3rd column 1b and 1c. If the quality of the material, the thickness, and the cross-section configuration of a steel plate are the same, as compared with single structure, flexural rigidity and twist rigidity of dual structure will improve. Therefore, rigidity of the protective construction of the 1st example improves fundamentally. If it puts in another way and will be this reinforcement, -izing of the main pillar 1 can be carried out [minor diameter], and the building envelope of a protective construction can be expanded, and an appearance fine sight will improve.

[0025] (2) The 1st - the 3rd column 1a-1c are fabricated in the location whose double door opening carries out opening to a lengthwise direction a little in respect of each junction side (it is "omitting welding for closing" surely), and does not correspond mutually in the state of junction as they are shown in drawing 1 (c). That is, since opening is not in agreement, it complements each other, after the simple substance reinforcement of each 1st-3rd column 1a-1c of every joining, and the fall of the main pillar 1 after junction on the strength is prevented. Moreover, the welding operation which closes opening of each 1st-3rd column 1a-1c can be excluded, and productivity is good. In addition, opening of each 1st-3rd column 1a-1c is welded, respectively, and it is good also as a perfect barrel. In this case, although the welding operation for closing opening increases, the reinforcement of the main pillar 1 after junction is higher than the thing after junction of above-mentioned opening-type two columns. Moreover, since the main pillar 1 after junction in the 1st example serves as a barrel, a fine sight is not spoiled. Furthermore, since the various preparations of the cross-section configuration of each 1st-3rd column 1a-1c are made, as for breadth and each division object, a design degree of freedom can aim at improvement in a fine sight on the formation of the further raise in rigidity, lightweight-izing, and easy manufacture about the thing from origin, and the protective construction itself.

[0026] (3) Although the 1st - the 4th minute segmenter are semifinished products, it is mostly settled in a flat surface, respectively (it considers as the "planar structure" below). Therefore, the following operation effectiveness is done so.

[0027] (1) Each division object will be the planar structure, and they will be accessories if it moreover sees from a protective construction. Therefore, an overhead welding can be lost even if there is no reversal fixture. Consequently, it is hard to produce a weld flaw. That is, it is necessary to arrange neither a welding expert nor a protective-construction reversal fixture, manufacture effectiveness improves, and it is economical.

(2) In stock [although in stock / each division object / as a semifinished product / these / since these are the total **** planar structures / it puts and]. Therefore, many inventories are securable in a narrow location. For this reason, it is made to solidify immediately on the occasion of the time of urgent shipment, and is made to a protective construction. In the 1st example, since there is no overhead welding in that protective construction itself, also at this time, it manufactures quickly and it can ship a protective construction with easy quality reservation.

(3) Even if car classes differ greatly, even a protective construction does not become large in proportion to car class. Therefore, only a few class and the degree of freedom assembled to the protective construction of the magnitude which changes for every car class with these combination, and a format produces each division object. Of course, the class of inventory can also be suppressed and an inventory location can be made small.

(4) Bolting which illustrates the junction structure between each division object to drawing 5 and drawing 6 which mention a detail later, then its solidification can be performed still more quickly and easily.

(5) Although not illustrated, it is desirable to constitute each division object beforehand so that attachment and detachment may become [panel / for wrap walls / as opposed to / for each division object / at least one of each division objects] free from a drivers side side (inside) or an anti-drivers side side (external surface) about the panel for wrap walls in the front face of a protection configuration further. If it does in this way, a protective construction with CABIN can be solidified extempore. In addition, the above "at least 1 of each division objects" is because it can consider as all sealing form CABIN or half-sealing form CABIN with the number of the panels for walls. In addition, in the case of all sealing form CABIN, it is natural to attach roof 4U.

[0028] the 2nd -- an example -- drawing 2 -- a 3 column type -- it is -- the 3rd -- an example -- drawing 3 and drawing 4 are 4 main-pillar types (that is, the 2nd and 3rd example is a three or more columns type). the 2nd and 3rd example -- a perspective view -- drawing 2 (a) and drawing 3 (a) correspond to drawing 8 (a) and drawing 9 (a) mostly on an appearance. Therefore, it has the beam 2 constructed between at least three main pillars 1 which also estranged the 2nd and 3rd example mutually and set it up to the circumference of the driver's seat (un-illustrating) of an automotive vehicle (un-illustrating), and two main pillars 1 in the direction of the surroundings of the circumference of a driver's seat, and is constituted. [as well as drawing 8 (a) and drawing 9 (a)] Hereafter, only the point which is different from the 1st example is explained about the 2nd and 3rd example.

[0029] It is block construction as the 2nd example is also shown in drawing 2 (b). However, the 2nd example is not a cantilever type protective construction like the 1st example but a three-point support type protective construction. Therefore, the 2nd example does not have the cantilever 3 and the 2nd beam 5 of right and left like the 1st example as it is shown in drawing 2 (a). That is, it is the trichotomy structure of an almost even rear face, a right face, and a front left surface. Each division object serves as a semifinished product which joined the crowning of 1st column 1a caudad towards the left end of a beam 2, and joined the crowning of 2nd column 1b also caudad towards the right end, respectively. In addition, a cross-section configuration is the barrel of a semicircle, and carries out opening also of any a little on a junction side face, and it is made for opening not to overlap, and 1st column 1a and 2nd column 1b of each division object are mutually fabricated free [weldbonding] as shown in drawing 2 (c). In addition, it is good also as a perfect barrel which welded each opening.

[0030] Therefore, when setting up the 2nd example to the circumference of a driver's seat, after setting up the lower limit section of either of the 1st and 2nd column 1a and 1b between each division object, or both by bolting (un-illustrating) etc. in the predetermined location of a driver's seat, these junction end faces will be welded and it will consider as the main pillar 1 per [each (carrying out full circled welding desirably)].

[0031] The operation effectiveness of the 2nd example of the above is fundamentally the same as the operation effectiveness of the existing theory of the 1st example. Therefore, duplication explanation is omitted.

[0032] It is block construction as the 3rd example is also shown in drawing 3 (b). However, the 3rd example is a four-point support type protective construction. Therefore, as well as the 2nd example, the 3rd example does not have the cantilever 3 and the 2nd beam 5 of right and left like the 1st example as it is shown in drawing 3 (a). That is, it is the quadrisection structure of an almost even order side and a right-and-left side. Respectively each division object joins the crowning of 1st column 1a caudad towards the left end of a beam 2, also caudad towards a right end, joins the crowning of 2nd column 1b, is constituted, and let it be a semifinished product. In addition, a cross-section configuration makes 1st column 1a and 2nd column 1b of each division object the barrel of an equilateral triangle, and they carry out opening also of any a little on a junction side face, and it is made for its opening not to correspond, and they are mutually fabricated free [weldbonding] as shown in drawing 3 (c).

[0033] Therefore, when setting up the 3rd example to the circumference of a driver's seat, after setting up the lower limit section of either of the 1st and 2nd column 1a and 1b between each division object, or both by bolting (un-illustrating) etc. in the predetermined location of a driver's seat, these planes of composition will be welded and it will consider as the main pillar 1 per [each (carrying out full circled welding desirably)].

[0034] In addition, having enabled each the attachment and detachment of roof 4U in each division object and the upper part for the panel 4 (4F, 4B, 4L, 4R) for wrap walls further from the page [4th] external surface of a division object is shown in drawing 3 (b). It is not necessary to explain that it can consider as all sealing form CABIN or half-sealing form CABIN also in this case.

[0035] The operation effectiveness of the 3rd example of the above is the same as the operation effectiveness of the existing theory of the 1st example. Therefore, duplication explanation is omitted.

[0036] In addition, although the cross-section configuration of the 1st and 2nd column 1a and 1b in the 3rd example may also be chosen suitably, the cross-section configuration of drawing 4 shows the example by the rectangular plane-of-composition welding formula. A division condition is shown in drawing 4 (b), and the partial diagrammatic view of the example of full circled welding is shown for the protective construction (partial diagrammatic view) of the completion condition of junction in the case of this example in drawing 4 (a) at drawing 4 (c). Thus, the cross-section configuration of the 1st and 2nd column 1a and 1b can be chosen suitably. Moreover, although welding of each division object serves as sideways, if it compares with facing up, it will be easy, therefore will be hard to produce a weld flaw.

[0037] in addition, drawing 5 of existing appearance -- and -- drawing 6 -- supplementary information of the example of junction between the division objects by bolting is carried out. If a hole is prepared in a barrel and there is extreme irregularity, the flexural rigidity and/or torsional rigidity will fall as everyone knows. Then, the example of a mode is explained variously, carrying out the partial extract of the configuration from drawing 5 to which the cross-section configuration carried out bolting of the barrels of an equilateral triangle, and drawing 6 to which the cross-section configuration carried out bolting of the rectangular barrels.

[0038] The through tube 72 of a bolt 71 is formed in the junction side face between 1st and 2nd column 1a and 1b, respectively as shown in drawing 5 and drawing 6 . Moreover, color 74a is inserted in through tube 75a, and periphery welding of the nut 73 has been carried out at the inner circumference of through tube 75a so that through tube 75of color 74a with nut 73 a may be prepared in the field by the side of anti-junction of 1st column 1a and the head of a nut 73 may not project from the external surface of 1st column 1a greatly to the exterior. On the other hand, it dents in the field by the side of anti-junction of 2nd column 1b, 76 is prepared, through tube 75of color 74b b is prepared in the pars basilaris ossis occipitalis of a depression 76, color 74b is inserted in through tube 75b, and periphery welding has been carried out at the inner circumference of through tube 75b.

[0039] Therefore, in junction between 1st and 2nd column 1a and 1b, a bolt 71 is inserted through color 74b, a through tube 72, and color 74a, and it binds tight in a nut 73. Such two or more configurations will be prepared between 1st and 2nd column 1a and 1b. According to such an example of bolting, both the colors 74a and 74b receive the axial tension of a bolt 71. And since the 1st and 2nd column 1a and 1b will be fixed to both the colors 74a and 74b The flexural rigidity and torsional rigidity of the 1st and 2nd column 1a and 1b hardly fall just because it prepared the hole (through tubes 72, 75a, and 75b) in the 1st and 2nd column 1a and 1b and established the depression 76.

[0040] Moreover, even if both the colors 74a and 74b may have the minute clearance delta in the field by the side of junction between 1st and 2nd column 1a and 1b, and may make them contact (delta= 0), and it makes them insert into a through tube 72 and they carry out periphery welding, they are not cared about.

[Translation done.]

* NOTICES *

JPO and NCIP are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is drawing showing the 1st example, and (a) is [assembly drawing and (c of a perspective view and (b))] X1-X1 sectional views of (a).

[Drawing 2] It is drawing showing the 2nd example, and (a) is [assembly drawing and (c of a perspective view and (b))] X2-X2 sectional views of (a).

[Drawing 3] It is drawing showing the 3rd example, and (a) is [assembly drawing and (c of a perspective view and (b))] X3-X3 sectional views of (a).

[Drawing 4] It is drawing showing the example of modification in the 3rd example, and (a) is [assembly drawing and (c of a perspective view and (b))] the P section enlarged drawings of (a).

[Drawing 5] It is drawing showing the 1st example of bolting.

[Drawing 6] It is drawing showing the 2nd example of bolting.

[Drawing 7] It is drawing showing the 1st conventional example, and (a) is a perspective view and (b) is X4-X4 sectional view of (a).

[Drawing 8] It is drawing showing the 2nd conventional example, and (a) is a perspective view and (b) is X5-X5 sectional view of (a).

[Drawing 9] It is drawing showing the 3rd conventional example, and (a) is assembly drawing and (b) is X6-X6 sectional view of (a).

[Description of Notations]

1: a main pillar and 1a: -- the 1st column and 1b: -- the 2nd column and 1c: -- the 3rd column, 2, 3: beam, the panel for 4: walls, and 4F: -- a front panel, the 4B: rear panel, a 4L: left lateral panel, a 4R: right lateral panel, a 4U: roof, and 5: -- the 2nd beam (reinforcing member) and 6: reinforcing member.

[Translation done.]